

Notice of Allowability

Application No.

10/002,316

Applicant(s)

TRYON, ROBERT G.

Examiner

Fred Ferris

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 11 July 2005.
2. ☒ The allowed claim(s) is/are 1-18 and 41-53. NOW RENUMBERED AS 1-31
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

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DETAILED ACTION

1. *Claims 1-52 have been presented for examination based on applicant's amendment filed on 11 July 2005. Applicants have now cancelled claims 19-31 and added new claims 38-52 by this amendment. Claims 32-40 are now cancelled by examiners amendment and new claim 53 is added. (See below) Claims 1-18 and 41-53 are therefore pending in this application and have been allowed over the prior art of record.*

Response to Arguments

2. *Applicant's arguments filed 11 July 2005 have been fully considered and found to be persuasive. The previous rejection of claims 1-18 and 41-53 is now withdrawn in view of applicant's amendment to the claims, the supporting arguments filed 7 July 2005, and the examiners amendment appearing below.*

EXAMINER'S AMENDMENT

3. *An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.*

Authorization for this examiner's amendment was given in a telephone interview with Mr. David Goren on 16 September 2005.

Amend claims 1, 41, and 47 filed 11 July 2005 as follows:

Amend claim 1 with the following:

- **Delete** line 14 (“preparing statistics using...”) and line 15 (“comparing said statistics...”)
- **Add** the word “**and**” after the word “life;” in line 13
Line 13 should now read: “life; **and**”
- **Add** the phrase “**using the results to provide a prediction of failure for the component.**” as the new line 14 and last line of the claim.

Amend claim 41 with the following:

- **Delete** the word “**for**” after the word “model” in line 8.
- **Add** the phrase “**included in**” before the phrase “the at least one RVE” in line 9
Line 9 should now read: “**included in** the at least on RVE...”
- **Delete** the word “**and**” after the word “output;” in line 10.
- **Add** the word “**and**” after the phrase “second output;” in line 13.
Line 13 should now read: “second output; **and**”
- **Add** the phrase “**using the first output and second output to provide a prediction of failure for the component.**” as the new line 14 and last line of the claim.

Amend claim 47 with the following:

- **Delete** the word “**for**” after the word “model” in line 11.
- **Add** the phrase “**included in**” before the phrase “the at least one RVE” in line 12.

Line 12 should now read: "**included in** the at least on RVE..."

- **Delete** the word "**and**" after the word "output;" in line 13.
- **Add** the word "**and**" after the phrase "second output;" in line 16.

Line 16 should now read: "second output; **and**"

- **Add** the phrase "**using the first output and second output to provide a prediction of failure for the component.**" as the new line 17 and last line of the claim.

Cancel claims 32-40.

Add new claim 53 as follows:

53. (New) The method of claim 1, further comprising:
preparing statistics using said results; and
comparing said statistics to a one or more probability of failure (POF) criteria; and
if the criteria is not met, repeating the steps of simulating, performing and using
with a different component.

Allowable Subject Matter

4. Claims 1-18 and 41-53 are allowed over the prior art of record.

The following is an examiner's statement of reasons for allowance:

Applicants are disclosing a system and method for predicting the failure of a component using Finite Element Modeling (FEM) and Representative Volume Elements (RVE) of the microstructure for analyzing stresses at the nodes of the structure model.

This has been disclosed in the prior art of record.

While these elements are individually disclosed in the prior art, the prior art of record does not meet the conditions as suggested in MPEP section 2132, namely:

*“The identical invention must be shown in as complete detail as is contained in the ... claim.” Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an **ipsissimis verbis** test, i.e., identity of terminology is not required. **In re Bond**, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).”*

In particular, while the prior art discloses the claimed limitation of “determining a Representative Volume Element (RVE) for at least one significant node, the prior art does not explicitly disclose “building a microstructure-based failure model for at least on RVE and including the microstructure-based failure model in the RVE” as now required by the amendment to independent claims 1, 41, and 47. (See: specification page 10, lines 5-19, Fig. 3(d), in particular line 13) Here, model information relating to the stress on the RVE, dimensions, properties, and microstructure of the material, are contained within the RVE for purposes of simulation.

The closest prior art uncovered during examination teaches certain limitations of the claimed invention as follows:

- “Probabilistic Fatigue Life Sensitivity Analysis of Titanium Rotors”, M. Enright: teaches a method and system (DARWIN) for predicting the failure of a component (structure) by representing a component element within a Finite Element Model (FEM) and subsequently identifying node stresses by analyzing the FEM model, but does not

explicitly teach building/simulating a microstructure-based failure model for at least on RVE and including the microstructure-based failure model in the RVE.

- "Fracture Mechanics Analysis in DARWIN", Southwest Research Institute: teaches the use of fracture mechanics (crack growth mechanisms) and considers the spatial correlation of regions for different geometries and damage mechanisms in calculating (by comparison) a component probability of failure, but again does not explicitly teach building/simulating a microstructure-based failure model for at least on RVE and including the microstructure-based failure model in the RVE.

The features noted above relating to building/simulating a microstructure-based failure model for at least on RVE and including the microstructure-based failure model in the RVE, renders the claimed invention non-obvious over the prior art of record.

Dependent claims 2-18 and 51, 42-46, and 48-52, are deemed allowable as depending from independent claims 1, 41, and 47 respectively.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."


Conclusion

5. *Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 571-272-3778 and whose normal working hours are 8:30am to 5:00pm Monday to Friday. Any inquiry*

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of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 571-272-3700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can be reached at 571-272-3780. The Official Fax Number is: (703) 872-9306

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